MER-0106-FM-8666-86

DEMONSTRATION AND TEST REPORT OF THE WQAU-P VALIDATION TESTING

Test Performed by:

Foster-Miller, Inc.
350 Second Avenue
Waltham, MA 02254

June 1987

CDRL - A013

Contract No. DAAK70-86-C-0106

Distribution Statement

Prepared for

U.S. ARMY BELVOIR RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
Fort Belvoir, VA 22060-5606

Tabular Summary Sheet

WAQU-P/Multiparameter Sensor			1/1	3/8	6/5	7/4	5/3	4/6	Cumulative Average
Parameter	Standards Tested	Required Accuracy	Numbers of Total Readings/% Correct						
Temperature	32°F, 68°F, 100°F, and 120°F	±2°F	83/94	78/99	78/96	84/96	86/98	84/99	493/97
Extreme Temperature	10°F, 20°F, 140°F, and 160°F	±2°F	40/98	40/75	40/85	40/95	40/60	40/98	240/85
Total Dissolved Solids*	50 and 100 mg/l 500, 1,500, and 3,000 mg/l 30,000 and 50,000 mg/l	±25 mg/l ± 250 mg/l ±2,500 mg/l	280/100	280/98	280/93	280/100	280/100	280/100	1,680/98
pH*	4, 7 and 10	±0.5	120/100	120/100	120/100	120/100	120/100	120/100	720/100
Turbidity*	3, 10 and 50 NTU 100 and 150 NTU	±5 NTU ±10 NTU	200/99	200/99	200/98	200/89	200/97	200/90	1,200/95
Residual	1, 7.5 and 15 mg/l	±10 mg/l	180/78	180/85	180/93	180/92	180/97	180/88	1,080/89

*Standards tested at temperatures of 32°, 68°, 100°, and 120°F.
**Standards tested at temperatures of 32°, 68°, and 90°F.

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1. REASON FOR TEST

To establish/validate the measurement capabilities of the Water Quality Analysis Unit-Purification (WQAU-P) that has been modified to accept the newly developed Foster-Miller multiparameter sensor.

2. DESCRIPTION OF EQUIPMENT TESTED

2.1 WQAU-P

The WQAU-P is a rugged, simple-to-operate, accurate and highly reliable water quality analysis unit that is capable of analyzing the temperature, total dissolved solids, pH, turbidity and residual chlorine of:

- Raw water feed to a reverse osmosis purification system
- Product water from a reverse osmosis purification system
- Raw water in situ (lakes, ponds, rivers, oceans).

The WQAU-P combines five water quality monitoring sensors with a state-of-the-art microprocessor to form a self-calibrating and easy to operate water monitoring instrument. The WQAU-P utilizes only one wet standard that is generated from a hermetically sealed packet of buffer powder (pH of 7). The logistic support problems of maintaining a fresh supply of perishable chemicals has been eliminated. Trained personnel can typically obtain a complete set of readings in less than 5 min.

The WQAU-P tested in this program was a modified version of the WQAU-P developed under contract DAAK70-85-C-0022.

2.2 Multiparameter Sensor

The Foster-Miller multiparameter sensor contains four water quality monitoring sensors (temperature, pH, conductivity (TDS) and turbidity). The temperature and conductivity sensors have pin socket connectors at their electrical end and are keyed

into the multiparameter assembly for alignment with the mating internal pins. The pH sensor is a threaded coaxial connector that is backed with an o-ring to provide additional water seepage protection. Each of these sensors is secured/sealed into the multiparameter assembly by a spanner nut that is backed with a rubber seal.

3. DISPOSITION OF EQUIPMENT

Six WQAU-Ps plus eight multiparameter sensors have been delivered to Fort Belvoir or a Fort Belvoir representative. Two multiparameter sensors remain at Foster-Miller to support Foster-Miller field service activities. These last two multiparameter sensors will be delivered to Fort Belvoir at the completion of Phase II testing (August 1987).

4. ABSTRACT OF RESULTS

Six WQAU-Ps with individual multiparameter sensors were subjected to an extended matrix of tests. More than 5,400 individual measurements were taken/recorded. Over 95 percent of the readings fell within the accuracy requirements for the parametric readings. The multiparameter sensor (temperature, TDS, pH and turbidity) provided over a 97 percent accuracy rate. Residual chlorine accuracy was 89 percent.

Over 55 percent of the TDS errors occurred when measuring salt concentrations of 50,000 mg/l (upper level of measurement). Turbidity errors were evenly distributed over all ranges. Approximately 60 percent of the residual chlorine errors occurred at the upper limit of 15 mg/l. Approximately 75 percent of the temperatures errors occurred below $40^{o}F$ when measuring fluids between 32^{o} and $120^{o}F$. At extreme temperatures (10^{o} to $20^{o}F$ and 140^{o} to $160^{o}F$), 95 percent of the errors occurred at the high range.

5. TEST APPARATUS

The following test equipment was used to perform WQAU-P validation tests.

Equipment/Chemicals	Manufacturer
Turbidity Meter, Model DRT-100D 0 to 10, 0 to 100, and 0 to 1,000 NTU, ±1 percent FS	HF Instruments, Inc. VWR Scientific Boston, MA
Santorious Balance Model 2474 160 gm maximum, 0.001 gm accuracy calibrated 5/86	VWR Scientific Boston, MA
Immersion Heater/Circulator Model 13276-456, 110 Vac	VWR Scientific Boston, MA
Polyethylene Tanks, 12 x 12 x 18 in.	Teracom Corp. Waltham, MA
NBS Certified Thermometer Model 15-041A, Purchased Jan 1987 -1^{o} to $51^{o}C$, $\pm 0.1^{o}C$	Fischer Scientific Medford, MA
Buffer Solutions pH 4 - SO-B-101 pH 7 - SO-B-107 pH 10 - SO-B-115	Fischer Scientific Medford, MA
Biological Grade NaCl Product S-671	Fischer Scientific Medford, MA
Formazin Stock Solution Product 15-393-2, 4,000 NTU	Fischer Scientific Medford, MA
DPD50 Free Available Chlorine R501 FAS Titrant R502 DPD Powder Buffer	Delta Analytical, Inc. Hauppauge, NY

6. TEST PROGRAM/PROCEDURES

6.1 Test Program

Table 1 details the test matrix that was followed when collecting process/validation data on the Phase III WQAU-Ps/multiparameter sensors. This table lists the measurement levels, fluid operating ranges (temperature and pH), number of measurements, number of measurements per sample and number of total measurements for each WQAU-P/multiparameter sensor.

Table 1. Parametric Test Matrix

Parameter	Measurement Level	Fluid Operating Range	Measure-ments	Measure-ments per Sample	Total Measure-ments
pH	4, 7, 10 pH units	36°F, 68°F, 100°F, 120°F	12	10	120
TDS	50, 100, 500, 1,500, 3,000, 30,000, 50,000 mg/l	36°F, 68°F, 100°F, 120°F	28	10	280
Turbidity	3, 10, 50, 100, 150 NTU	36°F, 68°F, 100°F, 120°F	20	10	200
Residual Chlorine	1, 7, 15	36°F, 68°F, 90°F and 5.5, 7.5 pH units	18	10	180
Temperature (Air)	10°F, 20°F, 140°F, 160°F	N/A	4	10	40

6.2 Test Data Sheet

A sample test data sheet is illustrated in Figure 1. Individualized data sheets were used for each monitored parameter and for each WQAU-P/multiparameter sensor tested. Multiple data sheets were used when one sheet was insufficient.

The column on the left was used to enter the value of the standard that was monitored. The next column was used to record the fluid temperature as measured by both the WQAU-P and the certified thermometer (actual). The third column was used to record the fluid's pH. This column was only used during residual chlorine measurements. The remaining 10 columns were used for recording the 10 individual measurements of the monitored standard.

6.3 Test Procedures

All testing was conducted with the WQAU-Ps connected to 110 Vac. The following test procedures describe how each of the WQAU-P parameters were tested/validated.

6.3.1 General

For any given parameter a sufficient quantity of appropriate test standards was prepared and divided into four test containers (fluid chambers). Each test container was placed in one of the four constant temperature baths ($36^{o}F$, $60^{o}F$, $100^{o}F$ and $120^{o}F$). The pH evaluation, for example, had three standards (pH of 4, 7 and 10) in each of the four constant temperature baths. The pH of each standard was then measured at a single temperature. When the 30 readings (10 each for each pH standard) at a single temperature was completed, testing continued at the next temperature level. This cycle continued until all standards were measured at each of the four temperatures. For pH this resulted in a total of

WQAU-P TEST DATA SHEET

Monitored Parameter ____________ WQAU-P Unit ____________
Sheet _____ of _____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
	/											
	/											
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Figure 1. WQAU-P Test Data Sheet

120 measurements per WQAU-P. A sample WQAU-P Test Data Sheet for pH is illustrated in Figure 2. This was the general test sequence that was used for all WQAU-P parameters except residual chlorine and air temperature.

Prior to collecting parametric data with the WQAU-P, a field calibration sequence was performed on the pertinent WQAU-P parameters. These field calibration procedures followed the field calibration procedures described in the Phase II WQAU-P Operation/Maintenance Manual (Contract DAAK70-86-C-0022). Table 2 details which parameters were field calibrated before obtaining a specific parametric measurement (a set of 10 readings).

To obtain a parametric measurement with the WQAU-P, the operator must press the "Press to Read" button. Since some sensors take time to stabilize (reach thermal equilibrium), the operator should alternately press and release the "Press to Read" button until the WQAU-P reading (digital display) has stabilized at a fairly constant value. For example, if a room temperature ($70^{o}F$) thermistor is immersed in cold water ($40^{o}F$), the first few readings displayed by the WQAU-P (one reading each time the "Press to Read" button is pressed) should steadily decrease. The true temperature is reached when successive readings remain constant. This procedure was followed for all measurements when required.

Specific procedures for each parameter are discussed in the following subsections.

WQAU-P TEST DATA SHEET

Monitored Parameter pH WQAU-P Unit 001
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
2	32.4 / 32°F	—	2.1	2.2	1.9	etc	...	...	...	...	...	...
7	32.6 / 32	—										
12	32.2 / 32	—										
	/											
2	75.0 / 75°F	-										
7	75.2 / 75	-										
12	75.1 / 75	-										
	/											
2	100.1 / 100°F	-										
7	100.4 / 100	-										
12	101.0 / 100	-										
	/											
2	120.3 / 120°F	-										
7	119.4 / 120	-										
12	119.9 / 120	-					...	...	...	...	12.1	12.2
	/											
	/											
	/											
	/											
	/											

* ONLY USED FOR RESIDUAL CHLORINE MEASUREMENTS

Figure 2. Completed WQAU-P Test Data Sheet for pH

Table 2. Parametric Field Calibration Requirements

Monitored Parameter	Parameter(s) Requiring Field Calibration
Temperature (Fluid and Air)	None
TDS	TDS
pH	pH
Turbidity	Turbidity
Residual Chlorine	Residual Chlorine and pH

6.3.2 Temperature (Fluid)

The temperature of each fluid standard was measured using both the WQAU-P and the certified thermometer prior to obtaining the 10 parametric measurements. Both of the measured fluid temperatures were documented in the temperature column of the Test Data Sheet.

6.3.3 TDS

TDS measurements were obtained using fluid standards that have been prepared by dissolving laboratory grade NaCl in deionized/demineralized water. For each condition (salt concentration and temperature) the temperature of the standard was measured with the WQAU-P prior to obtaining TDS readings. The multiparameter sensor was flushed and dried prior to changing standards.

6.3.4 pH

Certified pH buffers were used as standards during this phase of the test program. For each condition (pH value and temperature) the temperature of the standard was measured with

the WQAU-P prior to obtaining pH readings. The multiparameter sensor was flushed in deionized/demineralized water prior to changing standards.

6.3.5 Turbidity

Turbidity measurements were obtained using Formazin as the turbidity standard. The NTU value of the turbidity standards was verified using a recently calibrated HF Instrument (Model DRT-100D) laboratory turbidity monitor. Verification of an individual turbidity standard was performed before a sequence of measurements (set of 10 readings) initiated. The multiparameter sensor was flushed with deionized/demineralized water and dried prior to changing standards.

6.3.6 Residual Chlorine

Determination of the chlorine standard's chlorine concentration was achieved using a DPD-50 Residual Chlorine Test Kit. A DPD buffer/indicator was used to give the chlorinated water a rose-colored appearance. A RAF titrant was used to neutralize the color. Each drop of titrant was equivalent to 0.2 mg/l.

For each condition (chlorine concentration, pH and temperature), the pH and temperature of the chlorine standard were measured by the WQAU-P prior to obtaining a chlorine measurement.

The WQAU-P chlorine sensor reacts with chlorine during the measurement process. This reaction results in the depletion of chlorine (i.e., drop in chlorine concentration). Due to this reaction, a large volume (4 gal) of standard was utilized to minimize changes in the chlorine concentration.

6.3.7 Temperature (Air)

Extreme air temperature measurements were made using a dry ice chamber for 10^{o} and 20^{o}F, and a drying oven for 140^{o}, and 160^{o}F.

6.4 Acceptance Criteria

The accuracy requirements for each parameter are detailed in Table 3.

Table 3. WQAU-P Accuracy Requirements

Parameter	Range	Accuracy
Temperature (Fluid)	32^{o} to 120^{o}F	$\pm 2.0^{o}$F
TDS	0 to 500 mg/l 500 to 5,000 mg/l 5,000 to 50,000 mg/l	$\pm$25 mg/l $\pm$250 mg/l $\pm$2,500 mg/l
pH	2 to 12 pH units	$\pm$0.5 pH units
Turbidity	0 to 50 NTU 50 to 150 NTU	$\pm$5 NTU $\pm$10 NTU
Residual Chlorine	0 to 15 mg/l	$\pm$1.0 mg/l
Temperature (Air)	0^{o} to 160^{o}F	$\pm 2.0^{o}$F

7. TEST RESULTS

More than 5,400 individual measurements were taken/recorded with the Phase III WQAU-P/multiparameter sensors. Over 95 percent of the readings fell within the accuracy requirements for the parametric measurements. The multiparameter sensor provided over a 97 percent accuracy rate. Residual chlorine was less impressive, logging an 89 percent accuracy rate.

The cumulative percentage of correct readings for each parameter is listed in Table 4.

On an individual WQAU-P basis, the percentage of correct parametric measurements ranged as follows:

- Temperature (fluid) - 94 to 99 percent
- Extreme temperature (air) - 60 to 98 percent
- pH - 100 percent (no failures)
- Turbidity - 89 to 99 percent
- Residual chlorine - 78 to 97 percent.

Individual WQAU-P results are summarized in Table 5.

Table 4. Cumulative Test Results

Parameter	Total Number of Tests	Percent Correct Readings
Temperature (Fluid)	493	97
Extreme Temperature (Air)	240	85
Total Dissolved Solids	1,680	98
pH	720	100
Turbidity	1,200	95
Residual Chlorine	1,080	89

Table 5. Test Results for Individual WQAU-Ps

WQAU-P/Multiparameter Sensor	1/1	3/8	6/5	7/4	5/3	4/6
Parameter	Percent Correct Readings					
Temperature (Fluid)	94	99	96	96	98	99
Extreme Temperature (Air)	98	75	85	95	60	98
Total Dissolved Solids	100	98	98	93	100	100
pH	100	100	100	100	100	100
Turbidity	99	99	98	89	97	90
Residual Chlorine	78	85	93	92	97	88

The remaining discussion focuses on the errors (deviation from standard that exceeds acceptance criteria) that were encountered, the corrective measures that were taken and the accuracy improvements that could be obtained by relaxing the parametric constraints at extreme ranges (i.e., TDS concentrations at 50,000 mg/l).

7.1 Temperature

Most of the temperature errors (75 percent) occurred when measuring fluids that were less than 40°F. The bulk of these errors occurred during testing of the first three units (WQAU-Ps 1, 3, and 6). During the prevalidation testing of WQAU-Ps 7 and 5, the source of low temperature errors was quantitatively established.

As designed the WQAU-P would receive a thermistor input that was processed into an analog millivolt signal that was equivalent to degrees Centrigrade (i.e., 20°C would be input as 20 mV). At low fluid temperatures, those reaching 32°F (0°C), (i.e., equivalent to a 0-mV input), the analog to

digital converter (A/D) would occasionally shift by 1 to 2 mV. This source for signal deviation generated an error of 1.8° to 3.5°F, easily exceeding the WQAU-P accuracy requirements.

The temperature processing circuit was modified by amplifying the analog signal by a factor of 10 (i.e., a 20°C input would be equivalent to a 200-mV signal). A 1- to 2-mV shift at 32°F (0°C) now generated only a 0.18° to 0.36°F error. After this change was made, temperature errors were reduced to infrequent random (range) variations.

7.2 Extreme Air Temperatures

Ninety-five percent of the extreme air temperature errors occurred at the elevated temperatures (140° and 160°F). Correction of the temperature measuring flaw described in subsection 7.1 had no influence on these temperature ranges. Both ranges, 10° to 20°F (-12° to -6.7°C) and 140° to 160°F (60° to 71°C) are well beyond the 0-mV input that upsets the A/D converter output.

If the accuracy for extreme air temperature was increased to 4°F, the total average error would be only 3 percent, a 97 percent accuracy rate.

7.3 Total Dissolved Solids

TDS errors were limited to the high and low measurement ranges (42 and 58 percent, respectively). Low range errors varied from 27 to 40 mg/l, averaging 33 mg/l. High range errors varied from 2,520 to 2,800 mg/l and occurred when measuring the 50,000-mg/l standard.

7.4 pH

Although there were no recorded errors, a drop in the measured pH value occurred at the lower test temperature (36° to 40°F). Figure 3 graphically illustrates this relationship for all pH buffers tested. Above 60° to 70°F, the measured pH values remained fairly constant, drifting upward only 0.1 to 0.2 pH units. Below this temperature range, pH values dropped by 0.3 to 0.5 pH units as the test standard temperature approached 32°F.

7.5 Turbidity

Turbidity errors, while in general being random relative to NTU value, were most prominent at the two upper temperatures (100° and 120°F). Ninety-eight percent of all turbidity errors occurred when measuring standards at these temperatures (38 and 60 percent, respectively). At the upper turbidity range (50 to 150 NTU, ±10 NTU), the turbidity errors varied from 11 to 26 NTU, averaging just under 15 NTU. At the lower turbidity range (0 to 50 NTU, ±5 NTU), the measurement errors varied from 6 to 12 NTU, with an average of 7.7 NTU.

7.6 Residual Chlorine

Table 6 illustrates how the frequency of residual chlorine errors increased as the chlorine concentration of the test standard increased. Ninety percent of the chlorine errors occurred when measuring chlorine concentrations at or above 7.0 mg/l. The average error for the high range (15 mg/l) was 1.74 mg/l. The average error for the mid range (7 mg/l) was 1.4 mg/l. If the accuracy constraint for chlorine was relaxed to +1.5 mg/L at the upper two ranges, the WQAU-P's chlorine accuracy would increase to 96 percent.

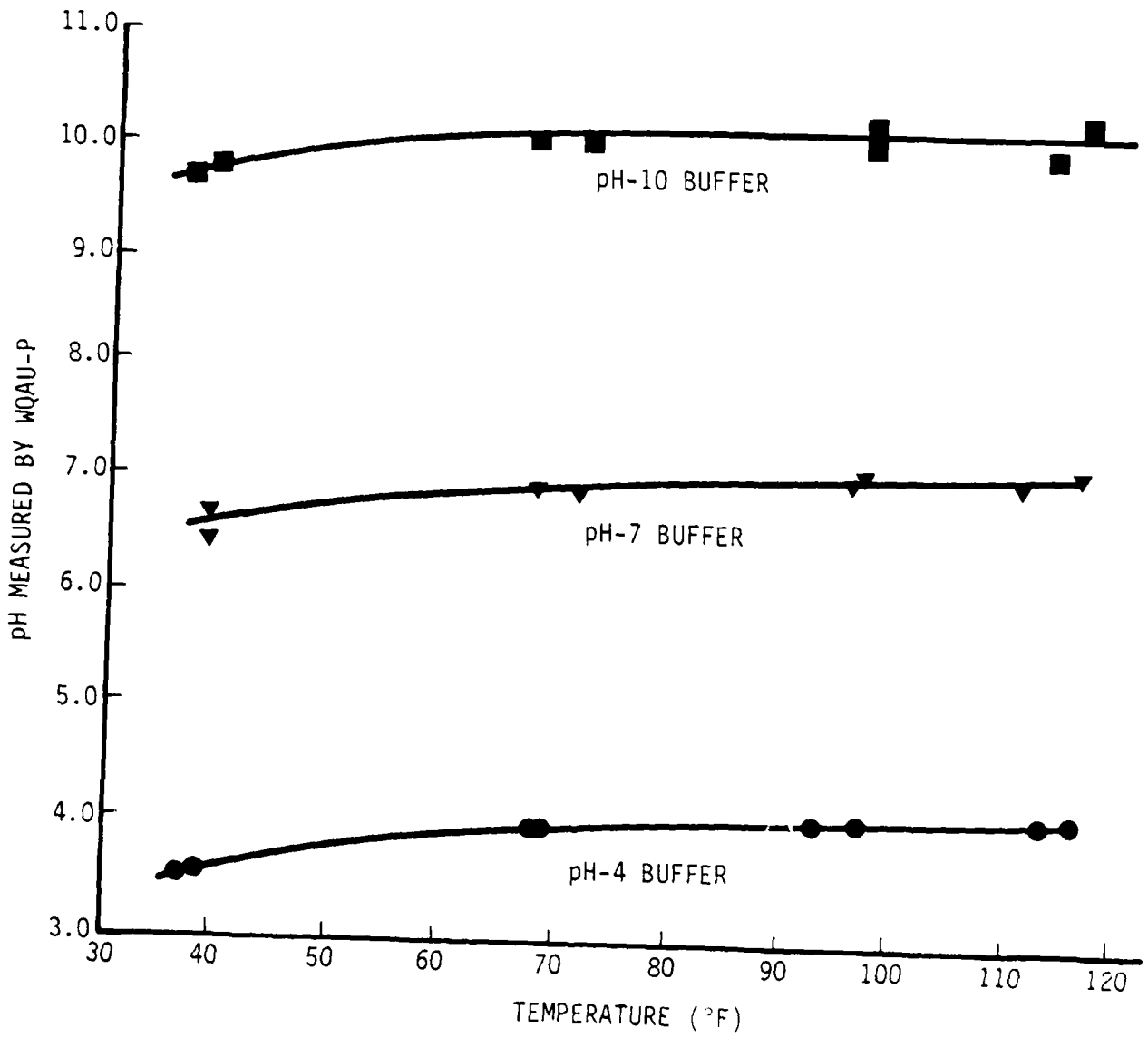

Figure 3. Influence of Sample Temperature on pH

Table 6. Breakdown of Residual Chlorine Errors

Standard (mg/l)	Percentage of Errors
1	10
7	31
15	59

All supporting test data (raw data) ha been included in the following section.

8. RAW TEST DATA

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 1

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50 mg/L	66.2/67.4		49	49	50	50	50	50	50	50	50	50	
100	68 /67.8		92	94	92	92	92	92	92	92	92	93	
	/												
50	42.8/42.8		40	40	40	40	40	41	40	40	40	40	
50	98.2/		45	45	44	44	43	42*	44	44	44	44	93.2/98.9
50	118/		46	46	44	44*	43	43	43	43	42	42	113/112.3
	/												
100	39.4/		98	98	98	99	99	102*	103	103	107	109	39.2/40.0
100	98.6/		105	104	106	101	100	99*	99	99	97	97	95/94.3
100	119.5/		94	94	94	92	92	90*	91	91	90	90	113/111.7
	/												
500	118.4/		525	524	523	523	519	516*	529	526	524	524	113/111.7
500	107.6/		496	496	495	495	494	493	491*	498	497	496	104/104
500	75/		519	516*	530	531	532	534	535	536	536	537	75.2/74.9
500	37.4/		520	524*	530	531	542	570*	566	570	571	573	41.0/42.1
	/												
1500	39.4/		1545	1541	1536	1536	1536	1536	1536	1536	1536	1545	39.4/41.4
1500	65.3/		1491	1493	1497	1500	1504	1504	1504	1504	1504	1501	64.3/65
1500	100/		1442	1437	1429	1425	1416	1408	1440	1431	1418	1405	95.0/94.6
1500	114.8/		1446	1444	1436	1429	1411*	1408	1408	1386*	1383	1363	109.4/111.2

** *

COMMENTS / OBSERVATIONS : * New temperature taken by WQAU-P.

** Temperatures taken at End

DATE : 4/4/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter pH WQAU-P Unit 1
Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
7	70.7 / 71.6		7.0	6.9	7.0	7.0	6.9	7.0	7.0	7.0	6.9	6.9
4	64.6 / 70.4		3.9	3.9	3.8	3.9	3.8	3.9	3.9	3.9	3.9	3.9
10	64.0 / 71.4		9.8	9.8	9.8	9.8	9.7	9.7	9.8	9.7	9.8	9.8
	/											
4	37.4 / 37.4		3.7	3.7	3.8	3.8	3.8	3.7	3.8	3.7	3.7	3.7
4	96.6 / 95.4		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4	163 / 163		4.2	4.2	4.2	4.1	4.2	4.1	4.1	4.1	4.2	4.2
	/											
7	37.2 / 38.4		6.7	6.6	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.7
7	99.2 / 98.4		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
7	116.0 / 115.6		7.0	7.0	6.9	7.0	7.0	7.0	7.0	6.9	7.0	6.9
	/											
10	39.2 / 41.9		9.6	9.7	9.7	9.6	9.6	9.7	9.6	9.6	9.7	9.7
10	100.4 / 98.9		9.7	9.6	9.7	9.6	9.6	9.7	9.6	9.7	9.6	9.6
10	111.2 / 110.3		9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	/											
	/											
	/											
	/											
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COMMENTS / OBSERVATIONS :

DATE : 4/4/87

SIGNATURE : L Rubin

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 1

Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
3000mg/L	120 /		2914	2884*	2931	2909	2870	2848*	2857	2826	2808*	2811	114.8/113.7
	105.8 /		2962	2958	2945	2937	2924	2916*	2960	2953	2947	2940	102.2/103.8
	73.3 /		3074	3066	3056	3052	3050	3050	3050	3050	3050	3056	73.3/76.0
	39.2 /		3224	3211	3191	3180	3162	3158	3153	3153	3153	3150	39.2/41.6
	/												
30,000	39.4 /		31555	31609	31718	31826*	31064	31064	31169	31169	31169	31275	42.4/43.4
	64.3 /		30118	30268	30343	30417	30867*	30867	30867	30867	30867	30867	64.3/65.1
	101.2 /		28915	28865	28815	28815	28765	28765	28765	28715	28665	28566	97.4/96.8
	114.4 /		28513	28513	28513	28513	28469	28297*	28705	28662	28618	28574	114.2/113.5
	/												
50,000	42.8 /		50211	50313	50416	50416	50518	50569	50620	50722	50722	50825	44.6/47.9
	66.2 /		47763	47859	47801	47801	47801	47801	47801	47801	47876	47876	66.2/67.1
	105.8 /		42223	42134	42134	42085	42085	42036	41987*	42622	42572	42522	102.2/102.2
	114.8 /		41433	41307	41307	41261	41261	41261	41216	41171	41171	41125	112/111.4
	/												
*50,000	68 /		49500	44600	49503	49503	49503	49503	48600	48600	48643	48643	68/67.1
	39.2 /		50522	50522	50522	50575	50575	50575	50575	50575	50628	50681	40.0/40.5
	99 /		47396	47386	47134	47374	47234	47211	47211	47556	47556	47444	98/97.6
	118.4 /		44446	44348	44348	44397	44397	44348	44348	44323	44249	44250	114/115
	100.4 / 99.8		50632	50579	50579	50574	50521	50521	50521	50521	50463	50463	
	117.5 /		49117	49958	48798	48634	48480	49469	49250	49066	48977	48922	

COMMENTS / OBSERVATIONS :

* Error in TDS program at high (+40,000mg/L) conductivity corrected. Validation Testing repeated.

TDS @ 50,000 drop in accuracy above 100°F

** 2nd change to software high end TDS. 4/9/87

DATE : 4/4/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Turbidity WQAU-P Unit 1
Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										After Temp WQAU-P / Actual
			1	2	3	4	5	6	7	8	9	10	
150 NTU	68 /		148	152	144	146	146	146	149	149	149	148	68/68.9
102	65 /		104	101	102	101	103	106	110	108	105	110	65/66.5
52	64.3 /		52	53	52	53	54	54	54	54	53	52	65.3/66.2
11.5	64.3 /		11	11	9	10	9	12	11	12	11	11	66/66.2
3.7	64.3 /		1	2	2	2	5	3	3	2	2	2	62.3/64.7
air bubbles	/												
3.7	37.4 /		2	2	2	3	2	2	2	3	2	2	34.2/41
9.0	37.4 /		7	8	10	9	9	8	8	7	8	9	41/43.1
52.0	34.2 /		52	53	52	50	54	53	53	52	53	56	39.2/41.7
97.0	39.2 /		97	98	97	99	98	101	100	98	99	98	37.6/39.0
147	39.2 /		147	148	148	147	148	148	147	146	147	146	39.2/39.2
	/												
146	103 /		143	143	142	142	142	140	145	143	146	148	93.2/92.5
98.5	104 /		100	101	100	97	98	105	107	98	102	104	96.7/96.2
51	104 /		46	47	47	46	52	51	50	52	55	54	98.6/98.2
10.6	105.8 /		10	9	8	8	12	10	11	11	11	11	100.4/100.4
3.7	105.8 /		4	4	0	1	2	7	7	6	6	7	102.4/99.9
	/												
	/												
	/												

COMMENTS / OBSERVATIONS :

DATE : 4/6/87

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WQAU-P TEST DATA SHEET

Monitored Parameter Turbidity WQAU-P Unit 1

Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
3.7	114.8 /		6	6	5	6	8	7	6	6	8	6	107.6/106.4
8.8	114.8 /		10	9	8	10	9	11	11	11	13	10	111.2/110.3
49.1	114.8 /		53	53	55	55	56	49	47	52	54	53	109.4/ 109.4
96.0	120 /		96	95	97	96	93	95	94	97	90	94	113/ 113
143	120 /		148	140	144	134	149	144	147	144	145	142	109.4/109
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COMMENTS / OBSERVATIONS :

DATE : 4/6/87

SIGNATURE : LS Robin

50m = 5 ml

WQAU-P TEST DATA SHEET

Monitored Parameter chlorine WQAU-P Unit 1
Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
18.6	61 / 62	4.7	17.1	16.8	16.8	16.9	17.1	16.9	16.5	17.1	17.3	17.1
6.6	61 / 62	4.8	6.7	6.6	6.5	6.5	6.7	6.6	6.2	6.3	6.0	5.9
.5	61 /	4.7	.8	.7	.7	.6	.4	.2	.2	.2	.2	.2
	/											
0.8	59 / 61	6.8	.5	.2	.8	.8	.9	.9	.9	.9	.3	.3
	59 / 61	6.6										
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COMMENTS / OBSERVATIONS :

DATE :

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter Air Temp WQAU-P Unit 1

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
3.0°F	/		3.2	3.2	3.4	3.0	3.4	3.6	4.0	3.0	3.2	4.0
9.4°F	/		10.1	10.1	10.2	10.3	10.0	10.2	10.1	10.6	10.2	10.0
140	/		138.1	139.0	138.8	138.7	139.0	139.0	140.0	140.4	140.2	141.2
158	/		157.1	157.4	157.3	157.3	157.2	157.9	158.4	161.2	158.7	159.2
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COMMENTS / OBSERVATIONS :

DATE : 4/6/87

SIGNATURE : L Rebo

WQAU-P TEST DATA SHEET

Monitored Parameter pH WQAU-P Unit 3

Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
7.0	68 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	68/69
4.0	71.6 /		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	71.6/71.8
10.0	71.6 /		10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	69.8/70.3
	/												
10.0	37.4 /		9.8	9.8	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	35.6/36.5
7.0	39.2 /		6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	42.8/42.8
4.0	39.4 /		3.6	3.5	3.5	3.5	3.6	3.6	3.5	3.5	3.5	3.5	37.4/39.2
	/												
4.0	93.2 /		4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.0	4.1	4.0	89.6/90.5
7.0	96.7 /		7.1	7.1	7.1	7.1	7.1	7.0	7.0	7.0	7.0	7.0	95.0/95.0
10.0	96.7 /		10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	96.7/96.6
	/												
10.0	113 /		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	111.2/111.0
7.0	111 /		7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	109.4/109.4
4.0	111.2 /		4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	109.4/110.3
	/												
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COMMENTS / OBSERVATIONS :

DATE : 4/8/87

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WQAU-P TEST DATA SHEET

Monitored Parameter TOS WQAU-P Unit 3

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50	39.2 /		53	53	53	54	54	54	54	54	55	55	39.2/41.8
↓	69.8 /		47	47	49	48	49	49	50	49	49	50	71.6/73
↓	98.6 /		43	43	43	43	43	43	43	43	42	42	93.2/94
↓	114 /		54	54	58	54	54	53	54	54	54	52	115/114.1
	/												
100	37.4/35.6		98	99	98	100	99	99	99	99	100	100	37.4
↓	69.8 /		118	116	116	118	118	118	118	118	118	118	69.8/71.6
↓	105.8 /		84	86	86	85*	85	85	85	85	84	84	102.2/103.1
↓	118.6 /		84	84	83	84	82†	84	84	83	83	82	117.4/118
	/												
500	37.4/36.8		486	486	493	495	496	496	497	497	497	496	37.2
↓	66.2 /		465	466	466	466	466	466	466	467	467	467	68/69.8
↓	104.0 /		453	450	448*	453	453	450	450	448*	461	458	102.2/102.2
↓	117.6 /		460	452	450*	458	452	440	438*	457	450	455	115/116.1
	/												
1500	66.2 /		1476	1475	1488	1480	1490	1498	1501	1502	1507	1513	68/69.8
37.4	35.6		1471	1443	1434*	1499	1499	1499	1503	1505	1506	1510	37.4
↓	103.2 /		1523	1523	1523	1521	1523	1515	1517	1515	1511	1524	101/102
↓	118.4 /		1513	1513	1515	1509	1501†	1534	1530	1529	1520	1518	117.4/116.5
	/												

COMMENTS / OBSERVATIONS :

DATE : 4/8/87

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WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 3

Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
3000	35.6/36.0		3066	3066	3000	3060	3060	3066	3062	3060	3060	3060	
	68 /		3107	3107	3114	3120	3133	3139	3135	3139	3139	3146	69/68.1
	103.1 /		3182	3182	3182	3182	3178	3219	3206	3215	3177	3119	102.2/103.1
↓	120.2/		3135	3127	3116	3102	3095	3159	3172	3130	3177	3116	118.4/118.2
	/												
30,000	66.2 /		30063	30060	30652	30652	30762	30162	30880	30800	30500	30800	68/68.7
35.6	136.2		29911	29811	29811	29831	29881	29681	29821	29701	29821	29791	
	104 /		28762	28762	28455	2850	28850	28858	28853	28521	28507	28525	103.1/102.2
↓	120.2/119		29794	29729	28707	29096	29052	28963	29361	29271	29226	29182	
	/												
50,000	66.2/66.2		48384	48347	48347	48347	48307	48347	48347	48347	48347	48347	66.2/65.7
37.4	138.1		49434	49325	49325	49325	49216	49217	49217	49247	49247	49217	
	104 /		48042	47927	47858	48124	48009	47895	48648	48697	48481	48422	102.2/101.9
↓	120.2/		47807	47734	47355	47333	47441	47384	47316	47530	47448	47417	119.8/119.6
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COMMENTS / OBSERVATIONS :

DATE : 4/8/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Turbidity WQAU-P Unit 3

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
150	68 /		151	151	151	151	151	155	151	151	151	151	68/68.5
~~103~~ 103	68 /		108	108	103	104	104	109	106	107	104	109	68/69
53	67.1 /		54	57	54	59	56	55	56	58	57	57	67/68
10.6	66.2 /		13	12	13	16	15	10	11	12	11	12	68/68
3.6	68 /		4	4	5	6	5	4	3	4	4	3	
	/												
155.8	37.4 /		147	150	153	153	153	153	153	153	153	153	37.4/36.8
65.0	35.6 /		102	104	107	106	107	107	107	107	105	107	37.4/35.1
52.4	37.4 /		54	56	54	56	56	54	56	56	56	56	38.2/37.5
11.4	37.4 /		10	10	11	12	11	11	11	11	11	11	37.4/38
4.1	37.4 /		6	5	5	5	6	6	5	5	6	5	39.2/38.7
	/												
148	100.4 /		149	142	143	142	144	143	143	142	143	143	93.4/93.4
100.4	102 /		98	99	98	100	95	100	98	106	105	99	99/98.1
51	97 /		49	51	50	51	52	52	51	51	51	51	97.7/97.9
11	103 /		10	11	11	12	8	10	9	9	8	10	98.3/99.1
3.7	99 /		6	6	7	6	2	3	4	5	4	2	100.4/100.4
	/												
	/												
	/												

COMMENTS / OBSERVATIONS :

DATE : 4/9/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Turbidity WQAU-P Unit 3

Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
3.5	118 /		2	2	1	0	1	2	2	0	0	0	107/108.2
10.4	116.6 /		12	10	8	11	11	10	11	6	7	9	109/108.4
51.7	120 /		45	46	46	42	52	51	55	49	49	51	112/111.7
99.5	122 /		92	95	93	90	93	92	(85)	90	93	90	111.2/110.7
149.0	121.2 /		146	145	146	146	147	144	147	(136)	146	147	109.1/110.1
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COMMENTS / OBSERVATIONS :

DATE : 4/9/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Turbidity WQAU-P Unit #6

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
152	68.2/67.8		144	148	148	160	155	154	163	157	156	156
101	68.4/67.6		99	99	98	97	96*	103	102	104	99	100
52	67.3/67.6		50	50	51	50	46	47*	49	50	51	50
11.4	68.0/67.8		12	9	7	8	7*	10	9	12	12	11
4.1	68.1/67.6		3	2	2	8	6	8	4	4	3	6
155	36.8/37.0		160	154	154	158	161	161	157	156	154	155
104	37.4/38.0		101	101	102	102	100	99	97*	99	99	97
54	37.6/37.0		56	52	53	54	54	55	53	51	51	49
12.2	37.6/37.6		10	11	11	9	6*	8	7	9	13	12
4.0	37.2/38.2		3	2	2	1	3	4	2	5	4	4
144	97.4/96.8		141	141	149	144	156	149	148	148	150	151
100	98.2/97.8		103	108	111	109	109	107	106	99	98	103
51	98.8/97.8		53	52	52	53	51	49	50	50	51	55
10.2	98.0/97.8		14	14	15	13	12	9	12	11	14	8
3.8	96.1/96.0		1	4	1	2	6	1	7	3	6	4
151	118.1/117.8		161	154	158	163	160	158	157	150*	164	154
107	117.3/117.6		110	111	110	108	109	107	114	111	111	112
54	118.2/118.0		56	58	56	57	49	61	54	54	52	52
10.4	118.4/118.0		10	10	9	10	12	10	8	6	8	11
3.2	118.0/117.8		1	1	3	1	2	4	6	4	3	2

COMMENTS / OBSERVATIONS :

DATE : 4/4/07

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter pH WQAU-P Unit #6

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
4	68.2/67.4		4.0	4.0	4.0	4.0	4.1	4.1	4.0	4.0	4.0	4.0
7	68.4/67.6		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1
10	66.6/67.0		10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
	/											
4	38.6/38.4		3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
7	34.0/38.6		6.7	6.7	6.8	6.7	6.7	6.7	6.7	6.8	6.8	6.8
10	38.8/38.6		9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8
	/											
4	97.2/97.4		4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
7	96.8/97.0		7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2
10	97.0/97.2		10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
	/											
4	116.4/116.2		4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2
7	116.4/116.0		7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
10	116.0/116.4		10.2	10.3	10.3	10.3	10.2	10.2	10.2	10.2	10.2	10.2
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COMMENTS / OBSERVATIONS :

DATE : 4/4/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit #6

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
50	67.2/67.0		53	54	54	56	54	54	54	56	56	56
100	67.4/67.2		96	96	97	96	95	94	95	96	95	95
500	67.4/67.2		482	480	482	483	484	485	485	485	484	480
1500	67.2/67.2		1402	1408	1398	1402	1400	1400	1406	1408	1400	1402
3000	67.4/67.2		2886	2880	2880	2840	2844	2816	2886	2844	2880	2880
30,000	67.4/67.2		29212	29285	29285	29264	29200	27258	29266	29280	29277	29276
50,000	67.0/67.2	2	48242	48255	47288	47888	47280	47892	47892	48110	48110	48004
	/											
	/											
50	38.2/38.0		51	51	52	52	55	54	54	54	52	52
100	38.2/38.0		100	98	96	96	96	98	97	94	97	97
500	38.4/38.2		479	477	483	483	483	488	479	476	480	482
1500	38.2/38.2		1401	1398	1396	1404	1408	1400	1401	1401	1390	1394
3000	38.0/38.0		2910	2902	2917	2925	2917	2900	2886	2888	2901	2901
30000	37.8/37.6	1	29825	29881	29881	27470	29111	28444	29331	29348	29411	29404
50,000	37.8/37.6		49899	49751	49751	50018	50004	50041	49942	49955	49510	49455
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COMMENTS / OBSERVATIONS :

DATE : 4/9/07

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WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit #6
Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
50	98.0/99.0		47	48	48	48	51	50	48	48	50	52
100	98.6/99.0		94	97	96	96	96	97	91	98	93	94
500	99.0/99.2		498	490	491	491	498	491	491	490	482	479
1500	99.2/99.2		1424	1420	1424	1420	1434	1438	1460	1451	1451	1451
3000	99.0/99.2		2924	2904	2917	2927	2901	2881	2901	2905	2941	2924
30,000	98.4/98.8		30,111	30,019	30,144	30,111	30,201	30,020	29,990	29,990	29,987	29,921
50,000	98.6/98.8		51,189	51,189	52,013	51,976	51,976	50,336	50,220	50,121	50,054	51,121
	/											
	/											
50	118.0/117.8		46	46	45	45	45	45	45	43	41	45
100	118.2/117.8		90	91	90	91	91	91	91	92	91	91
500	119.1/119.0		484	482	481	484	484	484	484	479	484	484
1500	120.0/120.2		1408	1406	1401	1401	1401	1399	1398	1394	1394	1394
3000	120.0/120.4		2889	2889	2902	2945	2913	2913	2898	2889	2881	2881
30,000	118.2/118.0		29842	29660	29660	29176	29411	29411	29612	29603	29603	29752
50,000	119.0/117.5		53247	52184	52459	52231	52491	52164	52164	52164	52164	51991
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COMMENTS / OBSERVATIONS :

DATE : 4/9/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter: Chlorine WQAU-P Unit: #6

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10
17.8	67.4/67.0	7.4	16.9	17.2	17.4	17.4	17.2	17.2	17.0	16.7	16.7	16.8
8.1	68.0/68.0	7.3	7.8	7.8	7.7	7.6	7.5	7.6	7.2	7.2	7.1	7.0
1.6	66.8/66.6	7.2	1.2	1.2	1.3	1.2	1.3	1.3	1.3	1.2	1.2	1.1
	/											
14.6	68.0/68.2	5.6	14.1	14.1	14.0	13.7	13.9	13.5	13.8	13.7	13.7	13.7
7.8	67.4/67.4	5.7	7.6	7.6	7.6	7.4	7.4	7.5	7.4	7.3	7.3	7.3
1.4	67.7/67.8	5.5	1.4	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1
	/											
15.4	37.4/39.6	7.5	16.2	16.2	16.6	16.5	16.6	16.3	16.3	16.2	16.2	15.9
7.0	37.8/39.2	7.5	7.1	7.1	7.1	7.0	7.1	7.1	7.0	7.0	7.0	7.0
1.4	38.6/39.8	7.2	1.4	1.3	1.4	1.3	1.3	1.3	1.3	1.1	1.2	1.2
	/											
15.8	39.0/39.8	5.8	16.0	15.6	15.7	15.4	15.4	15.7	15.6	15.5	15.4	15.3
8.6	38.4/39.2	5.5	8.2	8.1	8.1	8.1	8.1	8.0	8.0	8.2	8.2	8.1
1.6	39.2/39.8	5.6	1.8	2.0	2.1	2.0	2.0	2.0	1.7	1.8	1.7	1.7
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COMMENTS / OBSERVATIONS :

DATE : 4/9/87

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UQAU-P TEST DATA SHEET

Monitored Parameter Chlorine UQAU-P Unit #6

Sheet 2 of 2

Value of Standard	Temperature of Standard (UQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
16.0	86/85.6	7.3	15.9	16.2	15.9	15.9	15.8	15.6	15.6	15.6	15.7	15.7
7.8	86/86.4	7.5	7.6	7.6	7.6	7.7	7.7	7.6	7.5	7.5	7.4	7.4
1.2	89.2/89.0	7.5	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
	/											
18.2	87.3/87.0	5.5	17.9	17.9	18.0	18.1	17.8	17.9	17.7	17.7	17.7	17.6
8.0	87.0/87.0	6.1	8.1	8.1	8.1	8.0	8.0	8.0	7.9	7.9	7.8	7.7
1.0	88.4/88.0	5.7	1.0	1.2	1.1	1.1	1.1	1.3	1.1	1.1	0.9	0.8
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COMMENTS / OBSERVATIONS :

DATE : 4/9/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter Temperature WQAU-P Unit 6

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
68F	/		7.6	7.6	7.6	7.6	7.7	7.7	7.8	7.8	7.8	7.8
21°C	/		21.1	21.1	21.2	21.2	21.2	21.2	21.2	21.2	21.4	21.4
138	/		137.8	137.8	139.0	139.2	139.2	139.8	140.8	140.2	140.8	140.2
158	/		156.2	157.1	157.1	157.1	157.1	155.4	155.2	156.2	156.2	156.2
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COMMENTS / OBSERVATIONS :

DATE : 4/9/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter Temp A.T WQAU-P Unit 3
Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
7°F	/		6.8	6.8	6.8	6.8	6.0	6.0	6.0	6.0	6.0	6.0
22°F	/		21.2	21.2	21.2	21.2	23	23	23	23	24.9	24.9
158°F	/		161.5	161.5	161.5	161.5	161.5	161.5	161.5	161.5	163.5	163.5
140°F	/		141.2	141.2	141.2	141.2	141.4	141.4	141.4	141.5	141.6	141.6
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COMMENTS / OBSERVATIONS :

DATE : 4/10/87

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WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 3

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
~~20.0~~	~~64~~	~~6.8~~										
19.6	67/64.4	6.8	18.8	18.9	18.9	18.4	19.5	18.4	18.6	18.2	18.8	18.8
10.0	68/67.7	6.8	8.8	8.7	8.9	9.0	8.7	9.0	8.9	9.0	9.2	9.0
1.0	71/71.2	7.0	1.7	1.7	1.6	1.7	1.5	1.4	1.5	1.4	1.3	1.7
	/											
	~~66~~	~~5.6~~	16.6	16.5	17.5	17.2	17.4	17.9	18.0	18.1	18.2	18.2
15.4	68/67.2	5.6	14.9	14.9	14.8	14.7	14.5	14.3	14.1	14.1	14.4	14.3
6.6	66/66.8	6.0	4.8	4.8	4.6	4.9	4.8	4.7	4.4	4.8	4.8	4.9
1.0	67/67.4	5.0	.6	.7	.8	.7	.6	.7	.7	.7	.6	.7
	/											
14.2	88/86.2	7.3	14.1	14.7	14.1	14.2	14.3	14.1	14.0	14.1	14.1	14.0
5.0	86/87.1	7.2	5.7	5.8	5.4	5.7	5.8	5.7	5.7	5.8	5.8	5.9
1.4	89/89.4	7.4	.8	.9	1.0	1.1	1.1	.8	.7	.8	.7	.6
	/											
17.4	88/89.0	5.7	18.8	18.7	16.4	17.9	17.5	17.7	16.9	16.8	16.9	16.7
8.2	90/91.0	5.6	9.4	9.1	9.0	8.8	8.6	8.7	8.8	8.6	8.4	8.3
1.1	91/91.4	5.2	1.0	1.1	1.0	0.9	0.8	0.4	0.5	0.5	0.4	0.6
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COMMENTS / OBSERVATIONS :

DATE : 4/10/87

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WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 3
Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10
13.8	38 / 38.2	7.4	14.1	14.8	14.9	14.4	14.7	14.2	14.1	14.1	14.0	13.8
9.0	39 / 38.4	7.5	10.0	10.1	10.0	9.7	9.6	9.5	9.5	9.4	9.4	9.7
1.4	37 / 36.8	7.2	1.7	1.6	0.8	0.9	1.2	1.3	1.2	1.1	1.2	1.0
	/											
17.4	37 / 35.8	5.6	19.2	19.0	17.9	18.4	18.2	18.0	17.7	17.8	17.4	17.6
7.3	39 / 38.2	5.3	7.9	7.4	7.6	7.7	7.8	7.9	8.2	8.0	7.7	7.4
1.7	40 / 39.0	5.2	1.6	1.4	1.3	1.3	1.3	1.2	1.4	1.2	1.1	1.2
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COMMENTS / OBSERVATIONS :

DATE : 4/10/87

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WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 1

Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10
15.2	41 /40.5	8	14.8	14.0	14.3	15.0	14.5	14.5	14.5	14.3	14.5	14.6
6.4	42/41.2	7.7	7.1	6.5	6.7	6.8	6.8	6.9	7.1	7.2	7.3	7.4
1.0	42/41.8	7.1	3.0	3.1	3.0	3.1	2.8	2.7	2.7	2.8	2.6	2.6
1.2	42/41.0	5.4	1.6	1.7	1.7	1.8	1.7	1.8	1.7	1.8	1.7	1.6
7.0	41/41.2	5.0	6.9	7.3	7.7	7.4	7.8	7.9	7.3	7.4	7.4	7.2
14.0	41/42	5.2	14.9	15.1	15.0	15.0	14.8	14.9	14.7	14.8	14.4	14.4
10.0	71/70.8	7.5	11.4	11.3	11.2	11.1	11.3	11.3	11.4	11.0	11.7	11.7
6.0	72/70.8	7.4	5.2	5.4	5.6	5.7	5.5	5.2	5.5	5.2	5.5	5.6
1.2	70/69.8	7.2	0.7	0.7	0.6	0.7	0.8	0.8	0.7	0.6	0.7	0.6
1.2	~~68~~ 70 / ~~68.2~~ 68.6	5.3	0.8	0.7	0.7	0.6	0.8	0.8	0.7	0.7	0.8	0.8
6.4	71/69.8	5.5	7.1	7.0	6.4	6.2	6.1	6.0	6.0	6.1	6.2	6.3
14.2	71/70.4	5.4	16.0	16.0	15.8	14.9	15.3	14.9	15.1	14.9	14.8	14.6
17.8	96 ~~[illegible]~~ /92	7.5	20.1	21.2	19.4	17.8	18.4	17.9	18.2	[illegible]	18.6	18.8
7.6	91/90.0	7.3	6.9	7.1	7.2	7.4	7.5	7.5	7.6	7.9	7.8	7.9
0.8	96/95.4	7.0	.7	.7	.8	1.3	1.0	1.1	.7	.5	.4	4
0.8	96 94.9	5.2	0.1	0.1	0.1	0.1	0.5	0.4	0.6	0.4	0.2	0.1
8.4	92/93.1	5.4	8.2	8.4	8.6	8.5	8.9	9.1	8.8	8.7	8.8	8.6
16.6	90/91.2	5.9	20.7	20.4	20.6	20.3	20.0	19.9	19.8	20.0	20.0	19.9
	[illegible]											
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COMMENTS / OBSERVATIONS :

DATE : 4/10/87

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WQAU-P TEST DATA SHEET

Monitored Parameter PH WQAU-P Unit S/N007 PROBE 004

Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										WQAU-P/Actual
			1	2	3	4	5	6	7	8	9	10	
4	41.0 /		3.5	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	41.0/39.4
7	37.4 /		7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	37.4/38.1
10	37.4 /		9.7	9.7	9.8	9.8	9.9	9.9	9.9	9.9	10.0	10.0	37.4/38.1
	/												
4	66.2 /		3.7	3.7	3.7	3.6	3.7	3.7	3.6	3.7	3.6	3.7	66.2/66.4
7	66.2 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	66.2/66.2
10	66.2 /		9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	66.2/66.6
	/												
4	98.6 /		4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	96.7/97.5
7	100.9 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	98.6/98.6
10	98.6 /		9.8	9.8	9.8	9.8	9.8	9.7	9.8	9.8	9.8	9.8	98.6/97.5
	/												
4	118.4 /		4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	116.4/115.4
7	116.6 /		7.0	7.1	7.1	7.0	7.0	7.0	7.0	7.0	7.1	7.0	114.8/114.3
10	118.4 /		9.6	9.7	9.7	9.7	9.7	9.6	9.6	9.7	9.7	9.6	118.4/116.4
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COMMENTS / OBSERVATIONS :

DATE : 4/28/87

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WQAU-P TEST DATA SHEET

Monitored Parameter PH WQAU-P Unit S/N005
Sheet 1 of 1 PROBE 003

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
4	~~41.0~~ 39.3		~~3.9~~	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	39.2/39.4
7	41.0 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	39.2/38.5
10	39.2 /		10.3	10.3	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	39.2/39.2
	/												
4	64.3 /		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	64.3/64.2
7	64.3 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	64.3/66.0
10	64.3 /		~~9.90~~	~~10.0~~	~~10.0~~	10.0	10.0	10.0	10.0	10.0	10.0	10.0	64.3/66.0
	/												
4	98.6 /		4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	95.0/95.7
7	95.8 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	93.4/92.8
10	98.6 /		10.0	10.0	10.0	10.0	9.9	10.0	10.0	10.0	10.0	10.0	95.0/95.7
	/												
4	114.8 /		4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	111.2/111.2
7	115.6 /		7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	113.0/112.8
10	116.6 /		10.0	10.0	10.0	9.9	9.9	9.9	10.0	10.0	9.9	9.9	111.3/112.8
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COMMENTS / OBSERVATIONS :

DATE : 4/28/87

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WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 007
Sheet 1 of 2

	Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
	50	37.4 /		56	56	56	56	56	56	56	57	58	60	37.4/37.6
	100	37.4 /		86	85	85	85	86	84	85	84	84	84	37.4/37.2
	500	37.4 /		403	404	404	404	403	404	404	404	404	403	37.4/36.3
	1500	37.4 /		1351	1354	1366	1356	1351	1354	1351	1351	1356	1351	37.4/36.9
	3000	37.2 /		2795	2795	2795	2790	2786	2790	2786	2786	2786	2781	37.4/36.3
	30,000	37.4 /		29604	29551	29540	29551	29556	29551	29551	29551	29551	29551	37.4/36.8
	50,000	37.4 /		47209	47209	47268	47263	47263	47263	47263	47263	47209	47209	37.4/36.9
		/												
	50	66.2 /		69	73	68	59	59	58	59	59	60	60	66.2/66.7
	100	64.3 /		85	90	85	85	86	87	85	86	85	86	64.3/66.0
	500	64.3 /		419	417	417	417	419	419	419	419	419	419	65.3/66.0
	1500	64.3 /		1437	1443	1448	1443	1443	1443	1443	1443	1443	1440	64.3/65.8
	3000	64.3 /		2973	2973	2973	2973	2973	2973	2973	2973	2973	2973	64.3/65.6
	30,000	64.3 /		31417	31417	31417	31417	31417	31417	31417	31417	31417	31417	64.3/66.0
	50,000	66.2 /		49251	47667	47667	47667	47667	47667	47667	47667	47667	47667	66.2/66.0
**	30,000	41.0 /		32337	32337	32376	32425	32425	32229	32229	32229	32229	32276	42.8/44.8
**	50,000	42.3 /		51189	50587	50387	50236	50136	50086	49986	49986	49986	50036	
***		/												
**	30,000	68.0 /		32087	32087	32087	32087	32087	32087	32087	32087	32087	32087	67/68.2
**	50,000	/												

COMMENTS / OBSERVATIONS :

* NEW TEMP. TAKEN

** REVALIDATED W/ NEW STANDARDS

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WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 007
Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50	100.4 /		31	31	81	39	37	39	34	35	39	34	96.7/97.2
100	100.4 /		77	93	77	67	69	67	69	67	69	66	94.2/93.6
500	102.2 /		373	373	373	372	373	371	373	373	369	368	100.4/100.9
1500	102.2 /		1311	1311	1311	1307	1308	1311	1307	1311	1303	1307	99.5/98.7
3000	102.2 /		2802	2798	2798	2798	2793	2797	2793	2789	2785*	2820	100.4/100.4
30,000	102.2 /		28810	28810	28810	28810	28840	28840	28840	28835	28840	28835	102.2/102.0
50,000	102.2 /		47895	47838	47838	47838	47838	47808	47781	47810	47741*	47908	100.4/100.2
	/												
50	120.2 /		36	36	36	37	36	36*	36	36	36	34	117.8/114.4
100	122.2 /		82	82	80*	78	78	73*	65	72	60	65	114.8/114.6
500	122.0 /		347	372	365	371	372	372	369	363*	366	369	120.2/118.5
1500	122.0 /		1359	1317	1310	1306*	1319	1311	1309*	1325	1317	1312	118.4/118.2
3000	116.6 /		2900	2884	2864*	2886	2886	2886*	2864	2888*	2870	2863	116.2/110.5
30,000	120.2 /		29968	29012	28968	28958	28947	28884*	29000	28922	28834	28790	117.5/117.4
50,000	123.8 /		47894	47741*	47758	47741	47326	47668	47581	47582*	47546	47336	118.4/117.9
30,000	98.6 /		30101	30208	30181	30129	30129*	31103	30021	30940	30830*	31228	93.2/92.7
50,000	100.8 /		49089	48977	48865	48888*	48753	48640	48584	48528	48472	48416	104.2/103.1
	/												
30,000	118.4 /		29805	29760	29760	29716	29672	29605	29559	29495	29496	29387	113.0/112.8
50,000	114.4 /		48758	48731	48703	48649	48594	48536	48881	48771	48715	48605	113.6/113.0

COMMENTS / OBSERVATIONS :

* NEW TEMP TAKEN

** REVALIDATED W/ NEW STANDARDS

DATE : SIGNATURE : 4/29/87

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 005

Sheet 1 of 2

	Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
	50	39.2 /		54	54	54	54	54	54	54	54	54	54	39.2/37.8
	100	39.2 /		85	85	85	84	85	84	84	84	84	84	39.2/36.8
	500	37.4 /		455	455	455	455	455	455	455	454	455	454	37.4/36.3
	1500	39.2 /		1325	1321	1321	1324	1321	1325	1325	1321	1317	1325	37.4/36.3
	3000	37.4 /		2833	2833	2833	2833	2828	2833	2824	2828	2833	2824	37.4/36.3
	30,000	37.4 /		28809	28809	28809	28809	28809	28809	28809	28809	28809	28809	37.4/36.3
	50,000	37.4 /		46061	46180	46180	46180	46180	46180	46180	46125	46125	46180	37.4/37.0
		/												
	50	66.2 /		60	60	60	60	60	61	61	61	61	61	66.2/66.2
	100	64.3 /		86	86	87	87	87	87	87	88	87	88	64.3/66.0
	500	64.3 /		452	451	450	452	452	452	452	451	452	451	64.3/65.1
	1500	64.3 /		1456	1456	1456	1456	1456	1456	1456	1456	1456	1456	64.3/64.8
	3000	64.3 /		2986	2993	2993	2997	2996	2996	2996	2993	2999	2999	64.3/64.8
	30,000	64.3 /		30624	30587	30587	30587	30587	30587	30587	30662	30587	30587	64.3/65.1
	50,000	64.3 /		47073	47073	47073	47073	47073	47073	47073	47073	47073	47023	64.3/64.8
**	30,000	42.8 /		32387	31913	31961	31961	31961	31961	32056	32056	32056	32104	44.6/44.5
**	50000	44.6 /		49765	49780	49667	49570	49521	49570*	48994	48937	48926	49043	46.4/47.3
		/												
*	30,000	68.0 /		31496	32376	32448	32301	32159	32159	32159	32159	32087	32087	68.0/68.9
**	50,000	66.2 /		50576	50729	50729	50729	50685	50805	50805	50643	50882	50643	66.2/68.4

COMMENTS / OBSERVATIONS :

* NEW TEMP TAKEN

** REVALIDATED W/ NEW STANDARDS

DATE : 4/29/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 005

Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50	95.0 /		44	41	43	43	43	43	43	43	43	42	95.0/94.8
100	91.3 /		80	79	81	80	79	79	79	80	80	79	91.2/91.8
500	98.6 /		433	433	430	433	433	433	433	430	432	432	96.7/95.8
1500	98.6 /		1406	1402	1403	1398	1398	1403	1401	1398	1394	1394	97.7/97.4
3,000	98.6 /		2889	2894	2894	2894	2898	2902	2897	2898	2898	2898	98.6/97.9
~~30,000~~	~~100.2~~ /		~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~28630~~	~~98.6/98.6~~
30,000	100.4 /		28637	28637	28637	28637	28663	28688	28668	28668	28668	28668	98.6/98.6
50,000	100.4 /		40142	40142	40118*	40118	40093*	40759	40676	40676	40626	40626	98.6/97.7
50	122.0 /		61	62	61	60	49	42*	39	38	36*	37	118.4/119.4
100	125.0 /		77	75	77*	77	77	77	77	76	76	76	120.2/119.8
500	125.6 /		429	429	429	429*	435	433	434	432	432	432	122.0/121.6
1500	123.8 /		1384	1380	1380*	1388	1386	1384	1381*	1395	1391	1387	120.2/120.1
3,000	123.8 /		3027	3027	3027	3023	3016	3004	3004	2997	2988*	3098	118.4/117.5
30,000	125.6 /		27559	27533	27513*	27965	27951	27788	27715*	28069	28077	28003	120.2/120.0
50,000	123.8 /		45052	45174	45122*	45565	45340	45230	45150*	45150	45096	45043	120/112.7
~~*~~ 30,000	100.4 /		29664	29767	29767	29716	29614	29664	29613	29582	29560	29485	95.0/94.7
~~*~~ 50,000	108 /		49763	49763	49763	49763	49651	49651	49657	49545	49595	49539	106/105
	/												
~~*~~ 30,000	120.2 /		29099	29143	29143	29143	29099	29056	29012	28990*	29317	29317	116/115.8
~~*~~ 50,000	119.2 /		47893	47892	47856	47856	47863	47863	47800	47863	47910	47910	108.3/110

COMMENTS / OBSERVATIONS :

* NEW TEMP TA REV

~~*~~ REVALIDATED W/ NEW STANDARDS

DATE : 4/20/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TURBIDITY WQAU-P Unit 057
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
147	64.3 /		143	138	144	142	143	140	142	142	143	146	64.3/65.8
100.7	64.3 /		97	98	99	100	99	99	100	99	97	99	64.3/64.9
53.7	64.3 /		52	53	53	52	55	53	55	52	57	52	64.3/65.5
11.0	62.6 /		10	10	10	10	11	10	16	11	12	11	64.3/64.2
3.1	64.3 /		0	1	2	3	2	4	3	3	3	4	64.3/65.3
150.0	37.4 /		147	144	146	148	150	148	148	150	148	148	39.2/41.4
100.5	37.4 /		99	99	100	99	99	100	101	98	99	99	37.4/38.6
53.9	37.4 /		54	56	54	55	54	54	54	55	56	54	37.4/38.9
11.4	37.4 /		10	8	9	10	10	11	12	11	12	9	32.4/35.6
3.6	37.4 /		3	4	3	2	3	1	3	2	3	2	38.3/37.6
158.2	93.2 /		149	148	155	154	156	153	154	155	154	156	81.5/80.7
104.9	95.8 /		112	111	106	(116)	111	111	112	102	105	113	84.6/80.3
54.6	95.0 /		53	60	54	54	53	(67)	62	55	57	(67)	84.2/83.7
13.4	95.0 /		18	17	(19)	18	17	(21)	(19)	18	(21)	(20)	86.0/87.9
3.8	98.0 /		3	(13)	9	(12)	9	(10)	(11)	7	2	(11)	82.8/83.8
129.9	122.0 /		(141)	127	130	128	131	130	131	127	128	127	102.2/100.4
108.1	119.4 /		115	109	108	112	(91)	104	103	108	105	104	105.8/106.0
44.3	117.6 /		39	(37)	46	(38)	(38)	(50)	48	47	44	(56)	109.9/110.6
11.2	118.2 /		7	14	7	12	12	(9)	15	(3)	6	9	105.8/106.1
# 3.7	118.4 /		9	6	3	2	2	4	1	5	0	6	109.4/110.3

COMMENTS / OBSERVATIONS :

DATE : 4/30/87 SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TURBIDITY WQAU-P Unit 005
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
148.3	64.3 /		150	147	147	147	154	145	147	148	150	145	64.3/64.7
100.2	66.2 /		98	105	105	100	99	100	101	100	99	103	64.3/64.5
54.0	64.3 /		55	56	55	56	55	55	56	55	55	54	64.3/65.5
10.5	64.3 /		11	11	10	11	10	10	10	12	13	4	64.3/65.3
3.1	62.4 /		4	2	3	2	3	3	3	2	4	4	62.6/62.9
149.9	37.4 /		152	151	150	152	154	152	148	150	151	150	41.0/42.6
101.4	37.4 /		105	106	107	106	106	107	107	107	102	102	39.2/[illegible].405
53.8	37.4 /		51	54	60	58	54	53	54	55	54	55	39.2/38.9
10.9	37.4 /		10	10	9	10	9	10	9	8	9	13	37.4/36.8
3.2	37.4 /		3	3	3	4	4	3	4	2	4	2	37.4/37.1
149.3	95.0 /		155	154	152	152	150	151	155	152	155	158	87.8/86.[illegible]
94.5	95.8 /		96	92	101	96	97	98	97	101	99	101	86.0/85.8
58.6	95.0 /		62	61	58	58	60	59	60	59	60	63	87.8/93.0
11.5	95.8 /		10	10	10	11	10	11	14	11	13	10	82.3/82.7
3.9	97.6 /		4	18	4	9	6	6	5	7	6	7	82.3/82.7
169.7	118.2 /		165	176	164	186	170	167	170	175	172	175	96.7/[illegible]
94.3	117.6 /		92	87	87	84	96	100	87	89	87	89	105.4/106.2
46.1	117.6 /		42	42	46	41	41	56	49	49	45	46	111.2/112.1
11.1	118.2 /		2	6	3	9	9	5	10	12	10	11	105.8/107.2
3.7	118.2 /		0	5	0	1	0	4	1	4	3	2	109.4/110.9

COMMENTS / OBSERVATIONS :

DATE : 4/30/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TEMP AIR WQAU-P Unit 007
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
32°F	/		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
212°F	/		21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2
~~139~~ 138	/		136.4	138.2	139.1	140	140	140	140	139	140	140
158	/		157	162	160	161	160	158	159	160	159	156
	/											
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COMMENTS / OBSERVATIONS :

DATE : 5/1/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter AIR TEMP WQAU-P Unit 005
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
23.0	/		21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2	21.2
8.0	/		8.6	8.6	8.6	8.6	8.6	7.7	8.6	8.6	7.7	8.6
[redacted]	/											
140	/		145	146	148	145	143	142	144	146	144	144
160	/		162	163	167	166	167	165	163	162	161	168
	/											
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COMMENTS / OBSERVATIONS :

DATE : 5/1/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 5
Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
13.4	68 / 69.1	7.4	13.3	13.3	13.4	13.4	13.4	13.3	13.3	13.3	13.1	13.1
10.7	67.7 / 68.	7.3	9.7	9.9	10.1	10.2	10.4	10.4	10.3	10.5	10.8	10.4
1.5	72.5 / 72.1	7.2	1.7	1.6	1.5	1.5	1.6	1.7	1.7	1.6	1.7	1.6
	/											
14	96 / 95.4	7.3	14.5	14.2	13.8	13.6	13.5	13.2	13.0	12.7	12.5	12.3 *
	/											
16.2	37.8 / 38.0	7.4	17.1	17.1	17.0	16.8	16.9	17.4	15.2	16.1	17.1	17.0
8.1	38 / 38.2	7.2	9.0	9.0	8.6	8.7	8.4	8.5	8.5	8.4	8.3	8.1
2.1	39.1 / 38.8	7.1	2.1	2.0	2.0	2.0	1.8	1.7	1.8	1.6	1.6	1.5
	/											
7.1	96 / 95.8	7.3	7.0	6.9	6.9	6.7	6.6	6.8	6.4	6.2	6.0	6.0
1.2	95.2 / 95.4	7.2	1.3	1.2	1.2	1.1	1.1	1.0	1.1	0.9	0.8	0.7
	/											
	/											
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COMMENTS / OBSERVATIONS :

* High Temp. Chlorine driven off to part.

DATE : 5/1/67

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter ____________________ WQAU-P Unit ________________
Sheet _____ of _____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
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COMMENTS / OBSERVATIONS :

DATE : SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter chlorine WQAU-P Unit 2

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
15.8	66/62.1	7.2	15.2	15.2	15.2	15.0	15.1	15.1	15.2	15.0	15.0	15.0	buffer
10.1	65.6/67	7.1	9.8	10.1	10.0	10.3	10.2	9.9	9.9	9.8	9.8	9.7	
1.8	71.7/72.1	6.9	0.9	1.5	1.6	1.7	1.2	0.9	1.2	1.2	1.2	1.1	
	/												
12.0	101/102	7.1	11.9	10.9	10.6	10.2	10.2	10.3	10.1	10.0	9.8	9.8	
	~~100/100~~	~~7.1~~											
14.4	36.2/36.8	7.2	15.1	15.0	15.2	14.9	14.8	14.7	14.7	14.6	14.5	14.3	
7.2	37.1/37.4	7.1	8.0	8.0	8.0	7.3	7.9	6.7	6.5	6.4	6.3	6.1	buffer
1.5	36.0/38.8	7.1	1.8	1.7	1.7	1.6	1.5	1.7	1.3	1.1	1.2	0.8	
	/												
15.2	71/70.6	5.3	14.9	14.9	15.3	15.1	14.6	14.7	14.4	14.3	14.1	14.0	
8.0	71/71.2	5.2	8.2	8.1	7.9	7.9	7.8	7.7	7.7	7.8	7.9	8.0	
	/												
	/												
	~~43/44.1~~	~~5.3~~											
	/												
	/												
	/												
	/												
	/												
	/												

COMMENTS / OBSERVATIONS : * Temp to hot chlorine coming off to quickly

Water + Chlorine + HCl to lower pH

pH 5.4 T- 60°F DPD- 4.4 WQM-3.6 mg/L

ADD Chlorine

4.3 60 DPD- WQM 6.1

ADD Chlorine:

DATE : 5/1/87 SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 7

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10
* 8.6	65.3/65.6	5.7	8.2	8.2	8.2	8.1	8.0	8.0	7.8	7.8	7.8	7.7
	65.3/65.7	6.0										
	/											
** 13.6	59.6/60.1	5.2	14.9	14.1	14.0	14.1	14.2	14.2	13.7	13.6	13.8	13.8
7.6	58.2/58.5	5.3	8.1	7.7	7.9	8.4	8.3	8.1	8.0	7.9	8.0	8.1
1.1	55.4/56.0	5.5	1.1	0.9	1.0	0.9	0.8	0.7	0.7	0.8	0.7	0.6
	/											
13.4 ~~13.8~~	32.4/38.3	5.1	12.6	12.5	12.4	12.8	12.6	12.1	12.2	12.1	12.3	12.1
4.0	38.5/39.0	5.1	4.8	4.7	4.6	4.6	4.6	4.6	4.6	4.7	4.6	4.5
0.8	37.7/38.1	5.2	1.2	1.2	1.3	1.4	1.3	1.3	1.2	1.2	1.1	1.2
	/											
13.6	96.0/95.1	5.3	15.0	15.2	15.1	14.8	14.5	14.3	14.4	14.4	14.2	14.7
5.6	95.7/95.4	5.4	5.6	5.5	5.4	5.6	5.3	5.4	5.2	5.0	4.7	4.5
0.9	98.0/97.7	6.1	.6	.6	.4	.5	.6	.5	.4	.4	.3	.2
	/											
13.5	96.0/95.0	7.2	13.4	13.4	13.7	14.0	13.7	13.4	13.2	13.0	12.9	12.7
7.0	99.3/96.0	7.1	6.5	6.6	6.5	6.3	6.3	6.3	6.0	5.7	5.4	5.0
0.4	96.9/	7.1	0.4	0.3	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1
	/											
	/											

COMMENTS / OBSERVATIONS : * pH adjusted with HCl not buffer

** Use buffer 4.0

DATE : 5/1/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 5

Sheet ____ of ____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
12.4	62.7/63.0	5.2	11.7	12.1	12.1	12.0	12.0	12.1	12.0	11.8	11.8	11.9
4.6	60.6/60.8	5.5	4.1	4.2	4.4	4.3	4.3	4.4	4.3	4.3	4.3	4.3
2.3	60.7/60.9	5.0	1.4	1.4	1.4	1.5	1.4	1.4	1.4	1.5	1.4	1.4
	/											
15.0	39.3/39.4	4.9	15.2	15.3	15.2	15.7	15.3	15.2	15.6	15.5	15.5	15.5
6.4	39.2/39.4	4.9	7.0	6.7	6.8	6.9	7.0	6.9	6.8	6.9	6.8	6.7
0.6	38.9/39.3	5.3	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.0
	/											
12.2	96.6/95.9	5.2	12.7	12.4	12.1	11.1	11.9	11.8	11.6	11.4	11.1	11.2
5.0	94.8/95.1	5.6	5.2	5.3	5.1	5.0	5.1	4.9	4.7	4.8	4.7	4.4
0.8	95.1/95.0	6.1	0.8	0.7	0.9	0.6	0.7	0.9	0.8	0.8	0.8	0.7
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COMMENTS / OBSERVATIONS :

DATE : 5/1/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter PH WQAU-P Unit 004 HEAD #006

Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
4	33.0 /		3.6	3.6	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	33.2/33.8
7	33.6 /		6.8	6.9	6.8	6.9	6.8	6.8	6.8	6.8	6.8	6.8	32.8/34.5
10	32.9 /		9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	33.4/36.5
	/												
4	68.7 /		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	68.7/68.4
7	68.9 /		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	68.9/69.1
10	68.7 /		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	69.0/68.4
	/												
4	102.5 /		4.0	4.0	4.0	4.0	3.9	4.0	3.9	3.9	3.9	3.9	101.7/100.6
7	94.7 /		6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	98.6/97.2
10	104.5 /		9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	103.0/102.2
	/												
4	111.2 /		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	111.2/110.1
7	112.4 /		6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	112.1/110.5
10	111.0 /		9.8	9.8	9.8	9.8	9.8	9.8	9.7	9.7	9.7	9.7	109.7/108.5
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	/												
	/												

COMMENTS / OBSERVATIONS :

DATE : 6/1/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter: TDS WQAU-P Unit: 004 INLAND 006
Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50	33.0 /		61	61	62	61	62	62	62	62	62	62	33.9/34.2
100	33.8 /		100	100	100	100	100	100	100	100	100	100	33.9/34.7
500	33.6 /		504	505	503	505	506	504	506	506	505	506	33.9/34.1
1500	33.8 /		1344	1397	1397	1397	1405	1397	1397	1397	1397	1397	33.6/33.4
3,000	33.8 /		2898	2898	2898	2887	2887	2887	2887	2887	2887	2887	33.6/33.4
30,000	33.6 /		31281	31281	31281	31394	31281	31394	31394	31394	31394	31394	33.4/33.4
50,000	35.4 /		49667	49555	49667	49667	49667	49667	49667	49667	49667	49667	35.0/34.6
	/												
	/												
50	~~60.3~~ /		~~39~~ 50	~~39~~ 50	~~39~~ 50	~~39~~ 50	50	50	50	50	50	50	67.8/68.5
100	67.4 /		86	86	88	89	88	88	88	88	86	88	68.5/68.4
500	68.5 /		468	470	471	471	471	470	471	469	471	469	68.1/68.4
1,500	68.7 /		1391	1391	1393	1391	1391	1391	1391	1391	1391	1391	68.7/69.3
3,000	68.9 /		2900	2900	2900	2900	2900	2900	2900	2900	2900	2893	68.1/69.1
30000	68.5 /		31570	31570	31642	31642	31583	31570	31575	31606	31570	31570	68.5/68.7
50,000	68.9 /		51219	51256	51256	51256	51329	51329	51329	51329	51329	51329	68.8/68.5
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COMMENTS / OBSERVATIONS :

50 @ 68.3 FIRST 4 READINGS @ WRONG TEMP

DATE : 6/2/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TDS WQAU-P Unit 0041 HEAD 006
Sheet 2 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement 1	2	3	4	5	6	7	8	9	10	
50	104.0 /		60	64	68 *	69	71	71	71 *	62	60	58	98.9/98.1
100	104.5 /		88	88	87	86 *	87	88	87	87	87	87	100.7/100.6
500	106.0 /		463	462	462	460 *	467	465	465	465	463	461	102.0/102.2
1,500	106.5 /		1364	1364	1360	1360	1355 *	1375	1370	1371	1366 *	1377	102.9/102.6
3,000	107.2 /		2861	2861	2861	2857	2853	2848	2842 *	2885	2877	2873	104.6/103.8
30,000	106.7 /		29825	29873	29873	29870	29849	29825	29825	29776	29727	29727	105.0/104.5
50,000	105.3 /		50222	50166	50110	50110	50110	50053	49997 *	50402	50345	50285	102.5/102.4
	/												
	/												
50	112.1 /		52	52	52	52	52	52	52	52	52	52	107.2/107.6
100	122.8 /		110	110	115	105	110	110	108	106	106	105	116.7/116.5
500	117.3 /		516	515	515	515	514	510	509	506	502	499	112.1/111.9
1,500	114.8 /		1399	1397	1397	1399	1395	1391	1390 *	1411	1407	1403	111.3/111.2
3,000	118.4 /		2893	2890	2889	2885	2875	2871 *	2921	2911	2906 *	2929	114.6/114.6
30,000	120.0 /		29099	29186	29186	29186	29186	29186	29186	29143	29099	29099	118.0/117.5
50,000	118.2 /		49372	49425	49425	49425	49425	49372	49319	49266	49213	49160	115.5/114.9
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COMMENTS / OBSERVATIONS :

* NO TEMP TAKEN

DATE : 6/3/87

SIGNATURE :

WQAU-P TEST DATA SHEET

Monitored Parameter TURBIDITY WQAU-P Unit 004 HEAD 006
Sheet 1 of 1

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement										
			1	2	3	4	5	6	7	8	9	10	
155.9	35.9 /	0	~~155~~	156	158	159	156	160	159	155	160	160	38.5/39.1
105.5	35.2 /	0	110	110	107	109	107	107	107	107	107	107	37.5/36.9
56.2	36.0 /	0	60	58	61	60	59	60	61	60	58	59	37.5/37.7
16.9	34.9 /	0	12	11	11	12	10	14	12	10	11	10	37.4/37.3
4.0	35.1 /	0	4	3	4	5	4	4	4	4	3	3	37.4/
→ 152.4	68.7 /	0	155	155	155	155	155	150	158	150	161	161	68.5/69.4
95.9	67.6 /	0	102	95	99	101	98	99	101	95	95	97	67.8/68.7
54.2	67.8 /	0	51	52	54	57	57	57	57	52	54	57	67.6/67.5
16.4	67.8 /	0	9	14	11	11	8	11	10	11	10	11	68.0/68.2
→ 3.7	67.6 /	0	1	3	2	3	3	3	6	4	3	1	68.0/67.8
148.0	104.0 /	1	145	140	153	143	146	139	* (165)	153	147	144	95.5/95.0
102.5	106.5 /	4	(89)	110	* 98	108	108	98	(120) *	(115)	(115)	110	98.9/98.1
53.4	102.0 /	1	50	54	56	50	51	43	63 *	59	52	(65)	97.8/98.1
11.5	101.3 /	1	~~X~~ 7	~~X~~ 14	~~X~~ 14	~~X~~ 4	12	10	* (21)	11	12	7	95.5/96.4
→ 3.9	104.6 /	1	1	0	1	1	0	0	(12)	7	0	1	98.5/98.4
144.2	119.1 /	4	149	(158)	(118) *	146	138 *	146	(162)	(161)	152	142	103.7/103.8
99.0	120.9 /	4	102	90 *	(119)	92	98	(114)	(78) *	106	(112)	96	110.4/111.0
50.6	121.4 /	2	61	54	43	(40) *	(33)	46	57	52	52	57	111.5/111.7
16.7	120.2 /	3	(4)	(3)	9	15	8	9	8	9	10	(4)	108.5/108.6
4.1	126.1 /	3	5	(13)	4	5	4	(11)	2	(16)	7	0	111.5/111.6

COMMENTS / OBSERVATIONS : 20/200

* STIRRED SAMPLE

1ST FOUR READING @ 10 NTU 101.3 °F NOT ENOUGH SOL'N IN CONTAINER READINGS REDONE

DATE : 6/3/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 4 thru 6
Sheet 1 of 2

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
13.6	61.4/62.0	5.6	14.4	14.6	14.8	14.5	14.4	14.2	14.1	14.1	14.1	14.0
7.0	60.8/61.0	5.7	8.1	8.1	8.1	8.0	7.8	7.6	7.6	7.6	7.5	7.6
1.2	61.0/61.4	5.5	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0
	/											
16.4	35.8/36.2	5.7	16.0	16.2	16.0	16.0	15.8	15.6	15.6	15.4	15.2	15.2
8.0	37.0/37.2	5.5	8.0	8.0	8.1	8.1	7.9	7.7	7.8	7.8	7.7	7.6
1.6	37.4/37.6	5.5	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1
	/											
15.2	88.2/88.4	5.8	15.8	15.8	15.8	15.6	15.4	15.1	15.1	15.0	14.7	13.8
7.6	87.0/87.2	5.6	7.8	7.7	7.7	7.6	7.4	7.2	7.1	7.1	7.0	6.0
1.0	88.4/88.8	5.4	1.2	1.2	1.1	1.1	1.1	0.8	0.9	0.7	0.7	0.7
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COMMENTS / OBSERVATIONS :

DATE : 6/8/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Chlorine WQAU-P Unit 4 and 6

Sheet 2 of ___

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
15.2	89/90.0	7.3	16.4	16.6	16.2	16.1	16.0	16.0	16.0	15.8	15.6	15.2
6.8	89.0/89.8	7.6	7.4	7.8	7.2	7.1	7.0	6.8	6.4	6.2	6.0	5.9
1.0	88.6/89.2	7.6	2.1	2.1	1.8	1.6	1.5	1.5	1.4	1.3	1.3	1.3
	/											
18.4	69.2/70.0	7.5	17.8	17.8	17.6	17.9	17.6	17.6	17.4	17.2	17.0	17.1
7.2	69.4/69.8	7.1	6.8	6.6	6.6	6.5	6.4	6.4	6.4	6.4	6.4	6.3
0.6	68.2/69.0	7.1	1.0	1.0	1.1	1.1	1.0	0.8	0.8	0.8	0.8	0.8
	/											
19.6	36.6/36.0	7.8	18.4	18.5	18.7	18.6	18.6	18.5	18.4	18.4	18.4	18.4
9.0	37.2/37.6	7.4	8.8	8.8	8.7	8.6	8.6	8.6	8.6	8.4	8.4	8.5
1.4	37.6/37.8	7.3	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.6	1.7	1.7
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COMMENTS / OBSERVATIONS :

DATE : 6/8/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter Air Temp WQAU-P Unit 4 head 6
Sheet ___ of ___

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
20.0	/		19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
10.0	/		9.6	9.6	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
	/											
* 142.8	/		143.2	142.2	143.2	143.2	142.6	141.6	141.4	141.4	141.4	141.4
160.4	/		157.8	158.4	158.4	158.4	158.4	158.4	159.0	159.0	159.0	159.0
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COMMENTS / OBSERVATIONS :

* Actual Temp 142.2 °F when testing initiated

DATE : 6/8/87

SIGNATURE : [signature]

WQAU-P TEST DATA SHEET

Monitored Parameter ____________________ WQAU-P Unit __________________
Sheet _____ of _____

Value of Standard	Temperature of Standard (WQAU-P/ Actual	pH of Standard*	Measurement									
			1	2	3	4	5	6	7	8	9	10
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COMMENTS / OBSERVATIONS :

DATE :

SIGNATURE :